UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/779,749	02/18/2004	Yoshihiro Kimura	H6808.0040/P040	2045

24998 7590 10/29/2010

DICKSTEIN SHAPIRO LLP
1825 EYE STREET NW
Washington, DC 20006-5403

EXAMINER	
JOHNSTON, PHILLIP A	
ART UNIT	PAPER NUMBER
2881	
MAIL DATE	DELIVERY MODE
10/29/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/779,749	KIMURA ET AL.	
	Examiner	Art Unit	
	PHILLIP A. JOHNSTON	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 August 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-18* is/are rejected.

7)☒ Claim(s) *12 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. This Office Action is submitted in response to the amendment filed 8-17-2010, wherein claims 12, 14 and 15 are amended. Claims 12-18 are pending.

Response to Arguments

2. Applicant's arguments filed 8-17-2010 have been fully considered but they are not persuasive.

3. The Applicant argues at page 9 of the remarks that, As described above, each of the first (longer) distances and the second (shorter) distances in Dudley, relied on by the Office Action, is not obtained from a single positive peak or negative peak (as claimed) of the derivative waveform, but is instead obtained from a plurality of positive or negative peaks 146/151. See also, Dudley, Fig. 3A. Accordingly, Dudley does not disclose, or render obvious, determining and comparing the first and second distances (or evaluation values), as claimed.

Further still, Dudley does not disclose, or render obvious, "determining ... regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the space pattern and the line pattern, respectively, when said second distance is longer than said first distance, and determining regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the line pattern and the space pattern, respectively, when said first distance is longer than said second distance," as claimed.

Instead, Dudley merely discloses determining positions of the left side and right side and measurements of a known convex pattern.

Archie is relied upon as disclosing "scanning line and space patterns" (Office Action, pg. 9) and does not remedy the deficiencies of Dudley as to claims 12 and 14.

Accordingly, Applicants respectfully submit that claims 12 and 14 are allowable over the cited combination. Claims 13 and 17 depend from claim 12 and are allowable along with claim 12.

Claims 15, 16 and 18 depend from claim 14 and are allowable along with claim 14. Applicants respectfully request the rejection be withdrawn and the claims allowed.

The examiner disagrees.

The applicant's arguments filed 8-17-2010 are based upon amendments to the claims that are not supported by the specification and are therefore moot.

For example, the amended claims now include the limitation; determining, "regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the space pattern and the line pattern, respectively, when said second distance is longer than said first distance".

The examiner considered the newly amended limitation above using paragraph's [0032] through [0040] in applicants published specification, and concluded that it is improper for the following reasons;

(a) The specification describes at [0039], using the distances between the peak position and the zero point of the positive and negative portions of the derivative waveform to compare

the space-side and line-side intervals of a single peak in a profile waveform, where the largest interval defines the line-side of the vertex of a profile peak and the smaller interval defines the space-side of the vertex peak. The difference between the intervals obtained for a single peak, are used to define the applicants "concavity" and "convexity" terminology,

(b) Nowhere in the specification is the term "correspondingly adjacent" found nor is there any description supporting such an interpretation of its use regarding regions of the sample defined by the peaks of the derivative waveform. Furthermore, "regions of the sample" cannot be "correspondingly adjacent" to "regions of the derivative waveform", because the regions of the sample are real structures and the regions of the derivative waveform are abstract structures, resulting from a mathematical relationship. The dictionary defines adjacent as having nothing spatially between two objects. Therefore, they cannot be correspondingly adjacent, as regards to a spatial correspondence, but can only have relative or relational correspondence.

(c) "Regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform" cannot be used to determine "the space and line pattern", because the first and second peaks of the derivative waveform are calculated for a single peak of a profile waveform. One of ordinary skill in the art recognizes that a profile waveform of a line pattern contains two peaks defining each line, which applicant correctly describes in Figure 3C. However, the specification contains no description of derivative waveforms being calculated for both peaks of a scanned profile waveform, as Dudley the reference teaches.

In addition, the applicant's claimed use of first and second peaks of a derivative waveform to determine the space pattern is incorrect, since no peaks are generated when

scanning a space pattern. The peaks obtained in a profile waveform are only generated when the particle beam strikes the raised line pattern,

Dudley discloses a derivative waveform of a profiled line structure at Col. 3, line 8-50, where distance values LEW 5 and LEW 2 are compared to define the rate of change of the derivative waveform (note Figure 3A) at multiple positions along pairs of positive and negative peaks. Dudley then performs a profile determining step by calculating the shape of the line structure by comparing multiple distance values. See also Col. 1, line 53-67; Col. 2, line 1-10 ; Col. 3, line 63-67 and Col. 4, line 1-30.

In light of the above, the applicant's argument that the references fail to show the newly amended limitations, is not supported by the specification and are therefore moot.

4. The rejection of claims 12-18 are maintained.

5. All claims stand finally rejected as shown below.

Objection

4. The amendment filed 8-17-2010 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states; that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: "regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform ".

Applicant is required to cancel the new matter in the reply to this Office Action.

Claims Rejection – 35 U.S.C. 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 12 and 14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contain subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Particular subject matter contained in claims 12 and 14 includes the limitation, "regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform to be the space pattern and the line pattern, respectively, when said second distance is longer than said first distance".

The examiner considered the newly amended limitation above using paragraph's [0032] through [0040] in applicants published specification, and concluded that it is improper for the following reasons;

(a) The specification describes at [0039], using the distances between the peak position and the zero point of the positive and negative portions of the derivative waveform to compare the space-side and line-side intervals of a single peak in a profile waveform, where the largest interval defines the line-side of the vertex of a profile peak and the smaller interval defines the space-side of the vertex peak. The difference between the intervals obtained for a single peak, are used to define the applicants "concavity" and "convexity" terminology,

(b) Nowhere in the specification is the term "correspondingly adjacent" found nor is there any description supporting such an interpretation of its use regarding regions of the sample defined by the peaks of the derivative waveform. Furthermore, "regions of the sample" cannot be "correspondingly adjacent" to "regions of the derivative waveform", because the regions of the sample are real structures and the regions of the derivative waveform are abstract structures, resulting from a mathematical relationship. The dictionary defines adjacent as having nothing spatially between two objects. Therefore, they cannot be correspondingly adjacent, as regards to a spatial correspondence, but can only have relative or relational correspondence.

(c) "Regions of the sample correspondingly adjacent to regions of said first and second peaks of the derivative waveform" cannot be used to determine "the space and line pattern", because the first and second peaks of the derivative waveform are calculated for a single peak of a profile waveform. One of ordinary skill in the art recognizes that a profile waveform of a line pattern contains two peaks defining each line, which applicant correctly describes in Figure 3C. However, the specification contains no description of derivative waveforms being calculated for both peaks of a scanned profile waveform, as Dudley the reference teaches.

The applicant's disclosure above describes comparing a single longer distance with a single shorter distance in a derivative waveform of a single profile peak to define the line pattern and the space pattern, and although the specification states at [0037] that this approach may be applied to all peaks in a waveform, there is no description as to how this is to be accomplished, nor would paragraph's [0037]-[0040] of the specification suggest that such an approach is intuitively obvious to one of ordinary skill in the art.

As a result, the examiner concludes that the specification does not contain clear, concise, and exact terms that would enable any person skilled in the art to make and use the now claimed invention.

For purposes of this examination, the examiner assumes the newly amended claim 12 and 14 limitation that begins with "determining", will read as follows;

"determining regions of the sample that corresponds to said first and second portions (or peaks) of the derivative waveform, when the second distance is longer than the first distance; to define a boundary between the line-side and the space-side of the line in said line and space patterns."

Claims Rejection – 35 U.S.C. 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 12-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,627,887 to Dudley, in view of Archie, USPN 6,472,662.

9. Regarding claims 12 and 14, Dudley discloses at Col. 2, line 48-66, a method of using scanning electron microscope to scan a pattern that includesthe following steps;

(a) scanning a particle beam over line structure 126 as shown in Figure 2 below, where a dimensional or profile waveform is generated by detecting the quantity of particles deflected back from the line structure, which is saved in memory. Col. 2, line 63-67 and Col. 3, line 1-7,

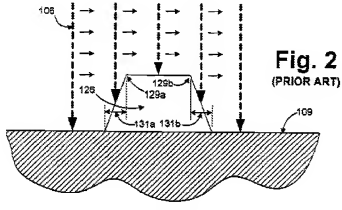


Fig. 2
(PRIOR ART)

(b) forming the derivative waveform from the stored dimensional waveform, as shown in Figure 3A below of. Col. 3, line 8-15; and Col. 5, line 5-20,

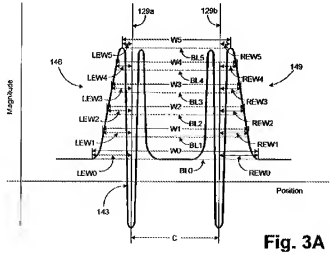
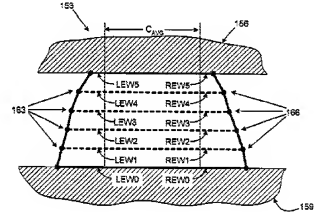


Fig. 3A

(c) comparing first longer distance LEW2 (Figure 3A above) of the positive derivative peak and second shorter distance LEW 5 of the negative derivative peak 143, which defines

the boundary 129a (note Figure 2) between the space-side and the line side of the peak, as well as the entire transition 131a from the left foot to the top edge of the left profile peak. Col. 3, line 16-50,

(d) determining the shape of the whole structure 126 as shown in Figure 3B, from the pairs of longer and shorter distances LEW1-5 and REW 1-5 between the two peaks in the derivative waveform (note Figure 3A above). Col. 3, line 63-67 and Col. 4, line 1-30.



Dudley discloses scanning the entire patterned structure of an integrated circuit at Col. 1, line 57-67 and Col. 2, line 1-10.

Dudley fails to disclose scanning line and space patterns.

Archie discloses obtaining waveforms of SEM scans over line and space patterns Col. 1, line 44-55 and Col. 3, line 4-8

Archie modifies Dudley to provide waveforms of scanned line and space patterns, where the geometry of the pattern includes equal line and space widths. Col. 8, line 55-67 and Col. 9, line 1-5.

Therefore it would have been obvious to one of ordinary skill at the time the invention was made that the scans of integrated circuit patterns of Dudley would include the line and space patterns of Archie.

10. Regarding claims 13 and 16, the combination of Dudley and Archie discloses the use of patterns having equal lines and spaces, as described above regarding claims 12 and 14.

11. Regarding claim 15, Dudley discloses referencing the pairs of longer and shorter distances LEW1-5 and REW 1-5 in the derivative waveform to baseline levels at the base or feet of each pair of peaks, where the 0% baseline level is equivalent to a zero line, base or flat line. Col. 3, line 16-25.

12. Regarding claims 17 and 18, Dudley fails to teach determining a target location for measurement of said sample based on the determined positions of said line and space patterns; however Dudley discloses use of a target structure and comparing measured profiles with a target profile. Col. 5, line 46-53. Dudley further teaches that the edges of the target structure are defined by coordinates at Col. 7, line 62-65 and col. 10, line 22-30.

One of ordinary skill in the art would recognize from the references above that samples are measured relative to the coordinate system location of the standard target of Dudley.

Therefore it would have been obvious to one of ordinary skill at the time the invention was made that the combination of Dudley and Archie teaches determining a target location for measuring the sample in accordance with the method described above regarding claims 12 and 14.

Conclusion

6. The Amendment filed on 8-7-2010 has been considered but is ineffective to overcome the references cited in the Office Action mailed 2-18-2010.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor Robert Kim can be reached at (571) 272-2293. The fax phone number for the organization where the application or proceeding is assigned is 571 273 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PJ
October 26, 2010

/Phillip A Johnston/

Primary Examiner, Art Unit 2881